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Appl. No.: 10/527,214

Amdt. Dated January 5, 2007

Response to Office Action Mailed October 6, 2006

REMARKS:

Applicant appreciates the time and care the examiner has taken in examining the application.

In the Amendment. Independent claims 10, 11, 13 and 17 are presented. Claims 13 and 17 have been rewritten to be independent, including all of the limitations of the base claim and any intervening claims. The dependent claims have been reorganized in accordance with the amendments to the independent Claims. Claims 21, 22, 24, 27, 32, and 37, which the Examiner indicated as allowable in the Office Action, have not been changed except that Claim 21 has been made to be dependent upon independent Claim 10, and Claim 22 has been deleted.

Response to Rejections. Applicant requests reconsideration of the rejections of the claims, and states the following in support. Conventionally, when a control electrode 22 is disposed continuously on a recess 12 and adjacent non-recess portions at both sides of the recess, as shown in Fig. 2 in this application, stress is concentrated on the side faces of the recess 12. An object of the present invention is to relax this stress.

As the stress relaxing means, each independent claim has the following configuration:

In Claim 10, the thickness of the control electrode on the recess is thinner than the depth of the recess.

In Claim 11, the thickness of the control electrode on the recess is thinner than the thickness of the control electrode on the non-recess portions.

In Claim 13, a percentage of voids of the control electrode on the recess is in a range of 10 to 90 percent.

In Claim 17, the control electrode on the recess is a thin conducting line for connecting

the control electrode on the adjacent non-recess portions at both sides of the recess.

In contrast to these configurations, in Doi et al., U.S. Patent Appl. Publ. No.2002/0146190, an electrode 7(7-1, 7-2, 7-3) is formed only on a non-recess portion at one side of a recess and a portion of the recess as shown in Fig. 1. This clearly is different from the present invention in which the control electrode is formed continuously on the recess and the adjacent non-recess portions at the both sides of the recess. In the configuration as disclosed in Doi et al., U.S. Patent Appl. Publ. No.2002/0146190, stress is not concentrated on the side faces of the recess, and thus, it is not necessary to provide a stress relaxing means on the recess as is provided in the present invention. Accordingly, the invention as claimed is neither anticipated nor rendered obvious by the disclosure of U.S. Patent Appl. Publ. No.2002/0146190.

Also in contrast to the invention claimed herein, in Doi et al., U.S. Patent No. 6,801,675, an electrode 7 is formed above a recess (13-1, 13-2) as shown in Fig. 1. In addition, the thickness of the electrode 7 on adjacent non-recess portions at both sides of the recess is the same as the thickness of the electrode formed above the recess, and a stress relaxing means as presently claimed is not formed on the recess. In such configuration as in U.S. Pat. No. 6,801,675, although stress is not directly concentrated on the side faces of the recess (13-1, 13-2), there is generated stress in the adjacent non-recess portions at both sides of the recess (13-1, 13-2), which draw close to each other or draw apart from each other due to a difference in thermal expansions of the electrode 7 and a substrate 1A, and eventually, stress is generated in the side faces of the recess (13-1, 13-2). Therefore, the invention as claimed differs from U.S. Patent No. 6,801,675 and is not anticipated thereby.

It is respectfully submitted that the application is in condition for prompt allowance and that all of the objections, rejections and requirements raised in the Office action have been met. Early, favorable treatment of this application is requested.

The examiner is encouraged to telephone the undersigned with any questions or comments so that efforts may be made to resolve any remaining issues.

The Commissioner is hereby authorized to charge any necessary fees, or credit any

overpayment, associated with this communication, including fees for any necessary extension of time under 37 CFR §1.136(a) for filing this communication, which extension is hereby requested, to our Deposit Account No. 50-0305 of Chapman and Cutler LLP.

Respectfully submitted,

By: 

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CERTIFICATE OF FACSIMILE TRANSMISSION UNDER 37 C.F.R. § 1.8

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I hereby certify that the attached correspondence, namely: Response to Office Action, was transmitted by facsimile on the date listed above, to the U.S. Patent Office at the facsimile number listed above, under 37 C.F.R. § 1.8.

Signature: 

Typed Name of Person Signing this Certificate: Robert J. Schneider

Date of Signature: January 5, 2007